Trend Study 20-6-03

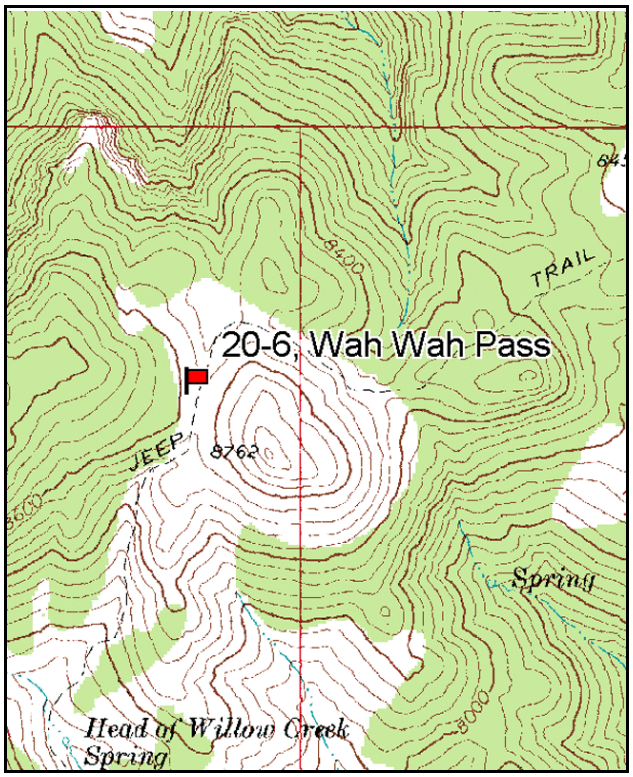
Study site name: Wah Wah Pass . Vegetation type: Curlleaf Mtn Mahogany .

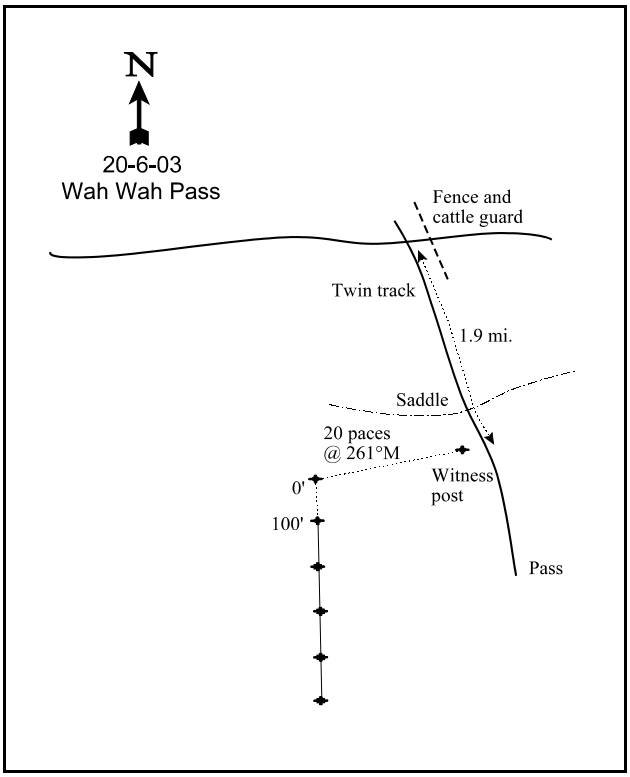
compass bearing: frequency baseline 184 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar: belt 4 on 1ft.

LOCATION DESCRIPTION

From the Indian Peaks cabin turnoff from the Pine Valley Road, go north 3.5 miles thru an "S" turn in the road and crossing a gully to a fork. Turn right and travel east 1.45 miles to a cattle guard. Continue about 7.1 miles up the canyon to the pass. Turn right before a fence and another cattle guard on a twin track. Travel south about 1.9 miles to a saddle and a witness post on the right side of the road. From the post the 0-foot stake is 20 paces at a bearing of 261 degrees magnetic.





Map Name: Lamerdorf Peak

Diagrammatic Sketch

Township 29S , Range 19W , Section 2

GPS: NAD 27, UTM 12S 4244242 N, 272488 E

DISCUSSION

Wah Wah Pass - Trend Study No. 20-6

This trend study was established in 1998 to monitor wildlife use on the Wah Wah Mountains. There were no trend studies previously established on these mountains because of low deer numbers. The study site was placed on the only area where significant deer and wild horse use could be found. It samples a saddle which supports a curlleaf mountain mahogany type with a sagebrush and snowberry understory. The slope is a gentle 5% to 10%. Aspect is northeast at an elevation of approximately 8,600 feet. The area is used by cattle, wild horses, deer, and elk. Cattle were observed on the site during establishment of the study on June 18, 1998. They were using many of the taller curlleaf mahogany for shade. Wild horses were also seen near the site in 1998 and 2003. In 1998, pellet group transect data estimated 18 cow, 11 deer, and 5 horse days use/acre (45 cdu/ha, 27 ddu/ha, and 12 hdu/ha). Some elk pellet groups were encountered along the frequency belts but not hit on the pellet group transect. Most of the cow and horse use is concentrated near the beginning of the baseline which borders an open meadow area. Deer use was more prevalent further down the baseline, where mahogany is more dense. Cattle had already heavily utilized the available grasses on the site prior to the 1998 reading. The area is considered high elevation winter range for deer, which is likely used year round with mild weather conditions. A wildfire burned the slope to the east of the study site sometime prior to the 2003 reading. This may have attracted more elk to the area. In 2003, pellet group transect data estimated 18 cow, 21 deer, 10 horse, and 14 elk days use/acre (47, 53, 24, and 35 days use/ha respectively).

Soil on the site is moderately deep with an effective rooting depth of just over 15 inches. Texture is a clay loam which is neutral in reaction (pH 6.8). Soil parent material is limestone. Phosphorus is low at just 2.6 ppm. Values of at least 10 ppm are considered a minimal value for normal plant development. The soil is fairly rocky with pavement and rock concentrated on the surface in the open interspaces. However, vegetation and litter cover are moderately abundant and erosion does not currently appear to be a problem.

The site supports a variety of browse species, but the most prominent is curlleaf mountain mahogany. Its density was estimated at 1,440 plants/acre in 1998 and 1,500 plants/acre in 2003. Overhead canopy cover of mahogany is variable but averaged 51% in 1998 and 56% in 2003. Available mahogany display moderate to heavy use. The stand is healthy with good vigor, fairly low decadence, and exceptionally good reproduction. Open areas between trees support mountain big sagebrush that are somewhat shorter in stature, showing some characteristics of black sagebrush. However, because of an effective soil depth of more than 15 inches and relatively cool soil temperatures, this population has more characteristics of what one would see in a tetraploid mountain big sagebrush. Density of sagebrush was initially estimated at 2,180 plants/acre in 1998 increasing to 4,080 plants/acre in 2003. Young plants are common and made up over 50% of the population in 2003. The population shows little utilization and fairly low decadence. There is also a good population of mountain snowberry under the mahogany. Density was estimated at 4,600 plants/acre in 2003. They appear lightly utilized with a few individual plants displaying moderate use. Vigor is good and percent decadence low at only 5%.

Singleleaf pinyon pine and white fir are found on the site in small numbers. Point quarter data from 1998 estimated 22 pinyon and 11 white fir trees/acre. Average basal diameter was 5 inches for pinyon and 6 inches for white fir. Total canopy cover was estimated at only 1.4% in 2003.

The herbaceous understory is depleted relative to its site potential. Initially, only 3 grasses were encountered on the site in 1998 and they produced only 2% total cover. During the 2003 reading, 6 grasses were sampled and they provided less than 1% total cover. Forbs are diverse, but they only made up about 6% total cover in 1998 and 2% in 2003. There are several preferred species present, but no single species produces a significant amount of cover. The most common forbs include pale agoseris, Eaton daisy, thistle, lousewort, and Palmer

penstemon.

1998 APPARENT TREND ASSESSMENT

Trend for soil appears stable due to the abundant vegetation and litter cover, combined with the gentle terrain. The key browse species, curlleaf mountain mahogany, appear to be slowly increasing with many of the mature plants becoming unavailable to browsing due to height. Seedlings are abundant and young plants comprise 36% of the population. The herbaceous understory is poor. Grasses are lacking. Forbs are diverse with several preferred species present. Abundance could be better however, as 25 forb species produce only about 6% total cover. Herbaceous production may be somewhat suppressed by the overstory of mahogany (51% canopy cover), although it appears that grazing animals currently have a greater negative impact.

2003 TREND ASSESSMENT

Trend for soil continues to be stable with abundant vegetation and litter cover combined with the gentle terrain. Trend for browse is slightly up. The key browse species, curlleaf mountain mahogany, appears to be slowly increasing with many of the mature plants becoming unavailable to browsing due to height. Seedlings continue to be abundant and young plants comprise 19% of the population. Mountain big sagebrush also appears to be in an upward trend with large increase in its population and excellent young recruitment (51% young plants). However, sagebrush is not an important aspect of this summer range and an increasing population is not necessarily desirable. Herbaceous trend would be slightly down because the majority of the cover (75% to 80%) has come from the forbs and they have decreased noticeably since 1998. The herbaceous understory is poor considering the site potential. Grasses were lacking in the past and are more so now. Forbs continue to be diverse with several preferred species present. However, their contribution to overall cover is still relatively low (<3% total cover) for such a high elevation site. Herbaceous production could be somewhat suppressed by the overstory of mahogany (56% canopy cover), although it appears that livestock currently has a greater negative impact on the herbaceous species.

TREND ASSESSMENT
soil - stable (3)
browse - slightly up (4)
herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Management unit 20 , Study no: 6

Type	Species	Nested Frequency		Average Cover %	
		'98	'03	'98	'03
G	Agropyron spicatum	7	12	.03	.04
G	Bromus tectorum (a)	-	3	-	.01
G	Carex spp.	-	3	-	.15
G	Oryzopsis hymenoides	3	3	.01	.01
G	Poa fendleriana	65	50	2.16	.40
G	Sitanion hystrix	-	2	-	.01

Type	Species	Nested Frequency '98	Nested Frequency '03	Average Cover % '98	Average Cover % '03
Total for Annual Grasses		0	3	0	0.00
Total for Perennial Grasses		75	70	2.21	0.61
Total for Grasses		75	73	2.21	0.62
F	Agoseris glauca	$_{b}$37	$_{a}$14	.73	.03
F	Balsamorhiza hookeri	$_{b}$7	$_{a}$1	.60	.03
F	Balsamorhiza sagittata	2	-	.15	-
F	Calochortus nuttallii	$_{b}$11	$_{a}$2	.05	.00
F	Chaenactis douglasii	9	5	.21	.01
F	Chenopodium fremontii (a)	$_{a}$-	$_{b}$14	-	.08
F	Cirsium spp.	$_{b}$43	$_{a}$15	.70	.26
F	Cryptantha spp.	5	5	.03	.03
F	Cymopterus spp.	1	-	.00	-
F	Erigeron eatonii	33	27	.40	.22
F	Eriogonum spathulatum	3	6	.15	.16
F	Gayophytum ramosissimum(a)	-	1	-	.00
F	Ipomopsis aggregata	6	3	.04	.00
F	Lappula occidentalis (a)	14	3	.08	.01
F	Linum lewisii	9	-	.23	-
F	Lupinus argenteus	$_{b}$18	$_{a}$6	.43	.23
F	Machaeranthera canescens	2	1	.03	.00
F	Mertensia arizonica leonardi	3	-	.15	-
F	Medicago sativa	4	-	.38	-
F	Pedicularis centranthera	21	16	.70	.62
F	Penstemon comarrhenus	$_{b}$13	$_{a}$-	.28	.01
F	Penstemon palmeri	$_{a}$-	$_{b}$23	-	.58
F	Penstemon pachyphyllus	$_{b}$13	$_{a}$-	.10	-
F	Petradoria pumila	14	11	.37	.24
F	Physaria chambersii	$_{b}$19	$_{a}$2	.58	.00
F	Polygonum douglasii (a)	-	7	-	.01
F	Senecio multilobatus	6	3	.06	.00
F	Taraxacum officinale	3	-	.03	-
Total for Annual Forbs		14	25	0.07	0.12
Total for Perennial Forbs		282	140	6.47	2.47
Total for Forbs		296	165	6.55	2.59

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 20 , Study no: 6

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Abies concolor	0	3	.15	.03
B	Artemisia tridentata vaseyana	40	37	6.40	4.03
B	Cercocarpus ledifolius	39	41	27.11	13.33
B	Chrysothamnus parryi	0	7	-	.59
B	Chrysothamnus viscidiflorus viscidiflorus	22	4	1.19	.30
B	Gutierrezia sarothrae	0	28	-	1.13
B	Leptodactylon pungens	0	1	-	-
B	Juniperus osteosperma	0	0	.38	.63
B	Mahonia repens	18	16	2.09	1.36
B	Pinus monophylla	2	2	.00	.03
B	Ribes cereum cereum	1	1	.63	.15
B	Symphoricarpos oreophilus	54	56	14.33	13.00
Total for Browse		176	196	52.30	34.60

CANOPY COVER, LINE INTERCEPT --
Management unit 20 , Study no: 6

Species	Percent Cover	
	'98	'03
Abies concolor	2.00	.98
Artemisia tridentata vaseyana	-	4.80
Cercocarpus ledifolius	50.79	56.43
Chrysothamnus parryi	-	.23
Gutierrezia sarothrae	-	1.95
Juniperus osteosperma	-	.80
Mahonia repens	-	1.28
Pinus monophylla	3.40	.60
Ribes cereum cereum	-	.11
Symphoricarpos oreophilus	-	16.14

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 20 , Study no: 6

Species	Average leader growth (in) '03
Artemisia tridentata vaseyana	0.9
Cercocarpus ledifolius	3.3

POINT-QUARTER TREE DATA --
Management unit 20 , Study no: 6

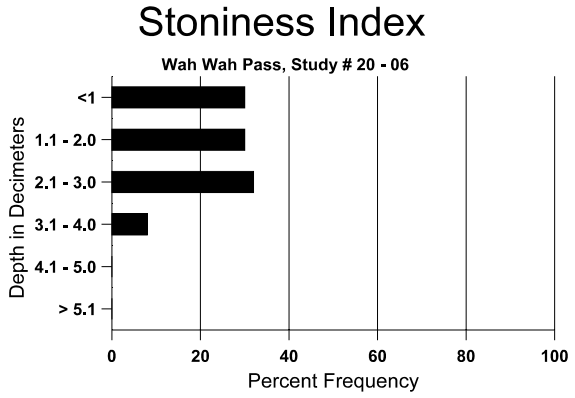
Species	Trees per Acre '98	Trees per Acre '03	Average diameter (in) '98	Average diameter (in) '03
Cercocarpus ledifolius	240	312	8.0	8.9

BASIC COVER --
Management unit 20 , Study no: 6

Cover Type	Average Cover % '98	Average Cover % '03
Vegetation	49.24	36.05
Rock	7.25	7.03
Pavement	8.96	4.26
Litter	74.97	65.70
Cryptogams	.00	0
Bare Ground	7.97	6.56

SOIL ANALYSIS DATA --
Management unit 20, Study no: 6, Study Name: Wah Wah Pass

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.2	55.0 (13.0)	6.8	29.6	34.8	35.6	4.9	2.6	195.2	0.7



PELLET GROUP DATA --
Management unit 20 , Study no: 6

Type	Quadrat Frequency	
	'98	'03
Rabbit	9	6
Horse	2	9
Elk	-	1
Deer	9	7
Cattle	8	5

Days use per acre (ha)	
'98	'03
-	-
3 (9)	10 (24)
-	14 (35)
11 (26)	21 (53)
3 (9)	19 (47)

BROWSE CHARACTERISTICS --
Management unit 20 , Study no: 6

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Abies concolor											
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**60**	-	60	-	-	-	0	0	-	0	-/-
Artemisia tridentata vaseyana											
98	**2180**	220	380	1240	560	180	0	0	26	10	11/20
03	**4100**	240	2100	1480	520	280	5	.48	13	2	10/18
Cercocarpus ledifolius											
98	**1440**	3960	520	880	40	100	32	4	3	1	68/102
03	**1500**	400	280	960	260	340	45	24	17	16	59/60
Chrysothamnus parryi											
98	**0**	-	-	-	-	-	0	0	0	0	-/-
03	**460**	-	140	280	40	-	61	13	9	0	8/11
Chrysothamnus viscidiflorus viscidiflorus											
98	**860**	20	100	700	60	20	0	0	7	5	6/10
03	**200**	-	60	120	20	-	0	0	10	0	11/14
Gutierrezia sarothrae											
98	**0**	-	-	-	-	-	0	0	0	0	9/14
03	**2780**	-	100	2660	20	120	0	0	1	0	8/9
Leptodactylon pungens											
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**380**	-	-	380	-	-	0	0	-	0	-/-
Mahonia repens											
98	**4800**	60	1140	3660	-	-	0	0	0	0	4/7
03	**9500**	-	-	9460	40	-	0	0	0	.42	3/5

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Opuntia spp.											
98	**0**	-	-	-	-	-	0	0	-	0	3/9
03	**0**	-	-	-	-	-	0	0	-	0	3/7
Pinus monophylla											
98	**40**	80	20	20	-	-	0	0	-	0	-/-
03	**80**	60	60	20	-	-	0	0	-	0	-/-
Ribes cereum cereum											
98	**20**	-	-	-	20	-	100	0	100	0	25/27
03	**20**	-	-	20	-	-	0	0	0	0	30/40
Symphoricarpos oreophilus											
98	**5000**	20	780	3900	320	-	5	0	6	.40	13/27
03	**4600**	-	140	4220	240	20	6	2	5	3	11/26
Tetradymia canescens											
98	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	10/26